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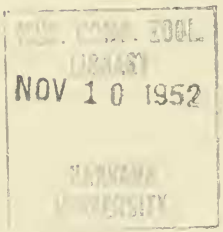
NOTES ON SOME PETRELS OF THE NORTH PACIFIC

BY OLIVER L. AUSTIN, JR.



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No. 7.—*Notes on Some Petrels of the North Pacific.*

By Oliver L. Austin, Jr.

In the course of preparing a comprehensive work on the birds of Japan[1] it has been necessary to review the extra-limital forms of several genera of Tubinares. As the results of this study are of significance in other areas, they are presented here instead of being held for inclusion in the work on Japan now in progress.

The Tubinares, particularly the smaller species, are a difficult group systematically because of their relatively slight morphological variation. Many of the populations occupy restricted but widely separated breeding grounds, to which it may be assumed they show a high degree of individual site tenacity. The group being an ancient one, some of the present breeding colonies may have been occupied continuously since late Tertiary time, possibly longer. Yet despite wide geographical separation, the birds have all existed under such similar ecological conditions that no structural modifications have been encouraged, and only minor fortuitous changes have been perpetuated genetically.

The recognition of geographical populations by their slight morphological differences can be of great importance, particularly in the petrels which wander so far over the trackless seas in the non-breeding season. Other than by extensive banding on the breeding grounds, the year-round movements and distribution of the various breeding populations can be learned only by the ability to assign to their proper nesting grounds all the specimens taken away from them. Systematic study of the geographical races of petrels has been hampered by the paucity of comparable specimen material, which must be taken on the breeding grounds and be of similar age, both of the individual when collected and of the specimens themselves. The problem is aggravated by a bewildering synonymy, a plethora of names given to minor variations shown by small, inadequate series, and in some cases on geographical grounds alone. The group has been attacked and mutilated by some of the most liberal and radical of splitters, and studied as well by some of the soundest and most conservative systematists.

No one relishes being considered either an unscrupulous "splitter"

[1] Financed in part by a J. S. Guggenheim Memorial Foundation Fellowship.

or an unconscionable "lumper", but at the moment my tendencies seem, in common with the general trend, to lean toward the latter and the "conservative right". A subspecific name designating a geographical population is of no practical use unless at least three-quarters or more of the individuals of that population can be identified correctly by their morphological characteristics alone. The recognition of variations in color is still largely a matter of individual ability, integrity, and judgment because we have yet to find a satisfactory method of measuring color accurately. For mensurable characters such as size, the most practical standard is the statistical device (see Simpson and Roe, 1939) whereby two populations are considered separable only when the means of a given character in each population are as far or farther apart then the sum of their standard deviations. This allows the separation of at least 84 per cent of each population from 84 per cent of the other. Among the petrels it is rare indeed to find the means of any character separated by two standard deviations, allowing a 97 per cent separation.

Many of the named petrel races have been described, despite almost complete overlap, on claimed "average" differences. Statistically these "average" differences are of no significance unless it can be demonstrated that two standard errors on either side of the respective means do not overlap, and even then it is not possible to identify individual specimens with any degree of confidence. It may eventually be desirable to name these "average" populations, but for present purposes I can see no practical value in a name unless it can be applied with assurance, and without reference to the collecting data on the specimen's label. In this study I have adhered as closely as possible to the "84 per cent from 84 per cent" convention.

Genus PTERODROMA — the Gadfly Petrels

The only members of this genus in the northwest Pacific belong to the difficult group separated by Mathews (1934b, 169) into the genus *Cookilaria*, but which Murphy (1929 and 1936) lumps with *Pterodroma* and divides into two species and ten subspecies. A more natural division of the ten recognized races both morphologically and geographically is into three species. I propose revising Murphy's key to the genus (1929, 2) as follows:

A.1. Crown and nape close to a "neutral gray" and concolor with the back:

1. *Pterodroma cookii cookii* (New Zealand)
2. *Pterodroma cookii axillaris* (Chatham Islands)
3. *Pterodroma cookii nigripennis* (Kermadec Islands)
4. *Pterodroma cookii orientalis* (breeding grounds unknown)
5. *Pterodroma cookii defilippiana* (Masatiera Id., Juan Fernandez)

A.2. Crown and nape mainly sooty black, much darker than the back, with which it forms a sharp contrast:

B.1. Inner web of outer primaries with a wedge-shaped white patch extending at least half the distance of the feathers from the base:

1. *Pterodroma leucoptera leucoptera* (east Australia and nearby islands)
2. *Pterodroma leucoptera masafuerae* (Masafuera Id., Juan Fernandez)
3. *Pterodroma leucoptera longirostris* (breeding grounds unknown)

B.2. Primaries wholly dark, with no white on inner webs:

1. *Pterodroma brevipes brevipes* (New Hebrides and Fiji Ids.)
2. *Pterodroma brevipes hypoleuca* (Hawaiian and Bonin Ids.)[1]

Pterodroma cookii does not occur in the northwest Pacific. *Pterodroma leucoptera* is represented there only by the rare and little-known *P.l.longirostris* which, though described originally from Mutsu Bay in northern Honshu, Japan, will probably be found eventually to nest in southern seas and to occur in the north Pacific only as a migrant. This form is still known only from ten specimens: Stejneger's type and cotype in the Yamashina Museum, Tokyo; two undated Owston skins from the type locality in the American Museum of Natural History

[1] It is extremely unlikely that Krusenstern Island, the type locality of *hypoleuca* (and also of Salvin's *Puffinus cuneatus*) is Ailuk in the Marshall group as stated by Fisher (1946, 588). According to Baker (1951, 65, 70), who nevertheless accepts Fisher's hypothesis, the only Micronesian records for *Pterodroma brevipes hypoleuca* and *Puffinus pacificus cuneatus* are the type specimens of each from the mysterious "Krusenstern". It is far more likely, as James C. Greenway, Jr. first pointed out to me in 1948, that when Captain H. J. Snow collected these specimens he was engaged on a feather raid at Laysan where both species are common, and used the mythical and unlocatable Krusenstern on the labels of the skins he sent back to England to hide the scene of his activities from the authorities and from his competitors. At Mr. Greenway's suggestion I searched in Japan for records of the old Yokohama firm of Owston and Snow, which might supply a clue to the island's identity, but no former associate of the firm is alive today, and any of its records that might have existed prior to the war were destroyed by the fire raids of 1945. The question can never be answered with certainty, but Mr. Greenway's logical hypothesis was accepted by Murphy (1951, 18) for the type locality of *cuneatus*. The type locality of Salvin's Œ*strelata hypoleuca* is hereby designated as Laysan Island in the Hawaiian group.

in New York; and the six specimens in the Chicago Museum of Natural History taken at sea by the Crane Expedition on 17 August 1929 about 600 miles east of the type locality (cf. Murphy 1930, 14–15).

Pterodroma brevipes breeds in the Hawaiian, Bonin, Fiji, and New Hebrides islands. No color differences have been ascribed to any of these populations, nor have I been able to discern any in the series I have examined. As suspected by most authorities from the few specimens previously available, an adequate series of *brevipes* from Japan and the Bonin Islands proves indistinguishable in measurements from the Hawaiian population, *P.b.hypoleuca* (table 1, fig. 1). However, the southern population of the Fijis and New Hebrides is separable from the populations of Hawaii and the Bonins on the basis of its smaller dimensions (table 1, fig. 1), particularly in the tail, to a lesser

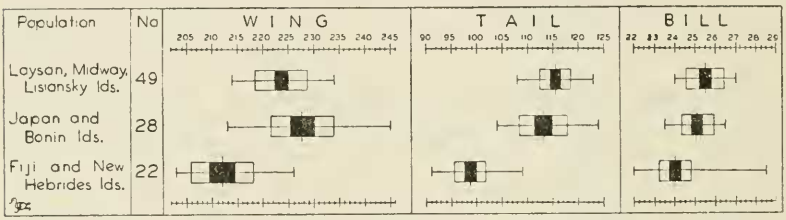

Fig. 1. Measurements of *Pterodroma brevipes* populations from Table 1 graphed in the form of Hubbs-Perlmutter diagrams. In each diagram the solid horizontal line represents the observed range of variation, the central vertical line represents the mean, the rectangle indicates one standard deviation to either side of the mean, and the black part of each rectangle indicates twice the standard error of the mean. (For a discussion of the use of this method to demonstrate differences and similarities between populations see Hubbs and Perlmutter, 1942.)

extent in the wing and culmen. The type of *brevipes* in the U. S. National Museum unfortunately has the longest tail in the series of southern birds, 109 mm., but the cotype's tail (also in the U. S. Nat. Mus.) measures only 94 mm. The exact collecting locality of these two birds is doubtful (cf. Murphy, 1929, 15), but the name is valid both for the species and the southern race.

Genus Oceanodroma — Storm Petrels

The Storm Petrels have a strong claim to the dubious honor of

being one of the most difficult systematically of avian groups. Their morphological differences are in many cases so slight that many forms of specific rank cannot be identified with certainty in the field, and some of them only with difficulty in the hand. Representative populations of some species, though oceans apart geographically, can be told apart if at all only by average measurements which allow fewer than half the individuals to be identified with assurance.

The characters used are size and color. Size variation is very slight, and color is frequently even less definitive and reliable. The various shades of black employed by many students of the group are deceptive and misleading. They vary within populations with the time of year or state of molt of the individual, and particularly with the age of the specimen. The lead "bloom" characteristic of several forms fades and foxes with age, both of the individual in life and of the museum specimen. Nevertheless color is a valid character, and in some cases more definitive than measurements, even though the differences can sometimes be seen only with a series of fresh specimens in the hand and in good light.

As I have been concerned with only three aggregations of this complex society of small black sea birds, I do not feel qualified to judge the larger systematic relationships of the group as a whole. Several of its elements have been separated as distinct genera, but under the present tendency to use the genus as a collective rather than a distinctive category, I believe it best to regard them all as congeneric. Nor does the establishment of subgenera seem warranted, though several of them combine into well-defined "species groups".

Oceanodroma castro — Madeiran Fork-tailed Petrel

This is one of the most wide-spread but least variable of the small black petrels. A small, white-rumped species, it is distinct from the other similarly colored and dimensioned species only in the shallower forking of its tail and in having the white rump feathers broadly tipped with black. Neither of these characters can be discerned without having the bird in the hand. It breeds in both hemispheres in widely-separated island colonies. Each of the known breeding populations has been named on minor color and size differences, and the synonymy is a long one.

I can find no valid color differences in the material I have examined, none that are not ascribable to age-foxing or seasonal wear and fading. Each population exhibits minor size differences, but figure 2 and table 2

show the futility of trying to assign any but a few extremes among the available specimens to their proper populations on measurements. Some of the series I have measured are admittedly small (though much larger than those used by the describers of all but the proposed

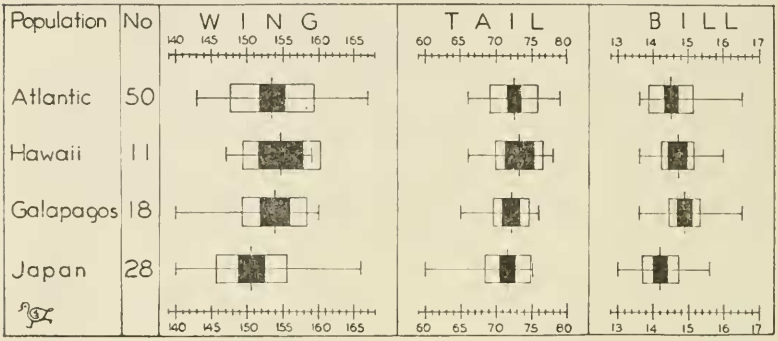

Fig. 2. Diagrammatic presentation of measurements of *Oceanodroma castro* populations from Table 2.

Atlantic races), but they are adequate by the tenets of modern statistical analysis. Not only is the overlapping almost complete, but there is no significant difference in their means, and larger series will undoubtedly show even slighter average differences. None of the proposed subspecies is tenable, and systematically the species is indivisible.

The MELANIA-MARKHAMI-TRISTRAMI-MATSUDAIRAE complex

Limited to the Pacific are four very similar forms of puzzling and ambiguous systematic relationship. They are the largest of the small, fork-tailed storm petrels, remarkably similar in size, and all are black-rumped. Two of them, *markhami* and *melania*, occur only in the eastern Pacific; the other two, *tristrami*[1] and *matsudairae*[2] only in

[1] When they described *Cymochorea owstoni*, Mathews and Iredale (1915, 581) discarded *tristrami* as of doubtful identity, in which they have been followed by Hartert (1915, 1415) and the Ornithological Society of Japan Special Committee (Hand-List 1942, 135). Although the type of *tristrami* was lost, the descriptions of it by Salvin in his "Key to the Species" of *Oceanodroma* (1896, 347) where the name *tristrami* is first mentioned, and by Ridgway in Salvin (*idem*, 354–355) are clearly identifiable in the light of the more adequate material now available. Three of the characters given are diagnostic, the tarsus length, the "plumbeous" color of the head and mantle, and particularly the light edgings of the tertials and wing-coverts. Coupled with the Sendai Bay type-locality (the bird is fairly common in those and adjacent waters, and none of the three similar forms with which it might be confused has ever been taken in northeastern Honshu), they leave no doubt whatever as to which form the name must be applied. I have examined the type of *owstoni* which, as suspected by Peters (1931, 74, footnote), is unquestionably a synonym of *tristrami*.

[2] Mis-spelled *matsudariae* in the origenal description (Kuroda 1922, 311),but named in honor of Marquis Matsudaira, the first serios student of the patrels in Japan. The original spelling is here-corrected.

the central and western. Hitherto they have been regarded tentatively as two subspecies respectively of two species, *tristrami* as a race of *markhami*, and *matsudairae* of *melania*. I consider them equally of specific rank, and key them as follows:

A.1. Tarsus 30 mm. or more:

O. melania (breeds on islands off southern and Baja California.)

A.2. Tarsus less than 30 mm.:

B.1. Primary shafts white at base, no lead bloom on head and shoulders:

O. matsudairae (breeds in the Bonin Islands.)

B.2. Primary shafts dark at base, a lead bloom on head and shoulders:

C.1. Tarsus less than 25 mm., wing bar poorly marked:

O. markhami (breeding ground unknown, perhaps in the southern Peruvian or northern Chilean Andes [Murphy, *in lit.*]. The one egg known was taken from a bird shot off central Peru.)

C.2. Tarsus 25 mm. or more, the upper secondaries and tertials lighter at the tips, forming a distinct wing bar:

O. tristrami (breeds in the Bonin, southern Izu [Torishima], and Hawaiian [Laysan] islands.)

Table 3 and figure 3 show the average and inclusive measurements of the specimens examined. Although all four species show average differences, their dimensions overlap so that they are of diagnostic

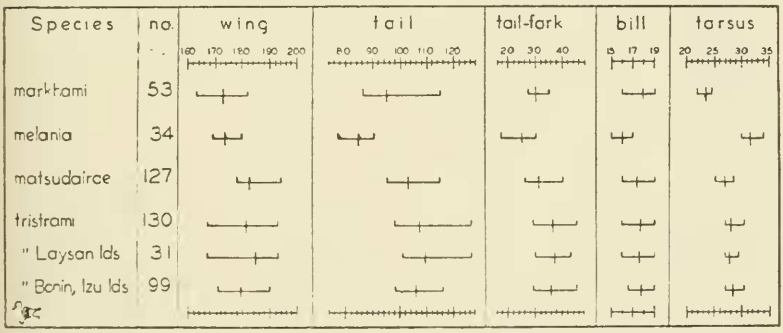

Fig. 3. Average and inclusive measurements of the Black Fork-tailed Petrels from Table 3.

value only in *melania* and *markhami*. *O. melania* has a longer tarsus with practically no overlap, and a shorter bill, tail, and tail fork than any of the other three forms, though the latter three characters have too much overlap to be of much value. *O. markhami* is distinct in having the shortest tarsus of the four.

Color differences are of more use in separating the four forms. The heads and shoulders of *markhami* and *tristrami* in fresh plumage show a pronounced lead-gray bloom which is lacking in the uniformly brownish-black *melania* and *matsudairae*. The bloom fades with time, however, so that old specimens of *tristrami* can be told from *matsudairae* only by the color of the primary shafts which in the latter are uniquely white at the base when viewed dorsally, less so ventrally. *O. tristrami* is distinctive in the light margins of the upper secondary and tertial coverts, which form a pronounced light wing patch. The differences and similarities of the four forms may be tabulated as follows:

	Tarsus	*Primary shafts*	*Heads and shoulders*	*Wing patch*
melania	30–34.5 mm.	dark	brownish	not pronounced
matsudairae	25–28.5	light	brownish	not pronounced
markhami	22–25	dark	lead gray	not pronounced
tristrami	26–30.5	dark	lead gray	pronounced

Only in the presence or absence of the lead bloom on the heads and shoulders do the four species divide themselves into two equal groups with one representative of each on each side of the Pacific. Each form otherwise has its own distinctive characteristics not shared by the other three: *melania* its long tarsus, *markhami* its short one, *matsudairae* its light primary shafts, *tristrami* its light wing patch. *O. tristrami* and *matsudairae* are unquestionably specifically distinct, because they breed sympatrically in the same colonies in the Bonin Islands. Although the breeding place of *markhami* is unknown, neither it nor *melania* so far as known is sympatric with the other or with either of the two western forms. Hence either or both might be conspecific with either *tristrami* or *matsudairae*. We have only external morphological characters to go by, and these are neither indicative nor salient. Actually there is no way of determining the relationships of these allopatric forms other than arbitrarily, and until better evidence is available of their possible subspecific affinities, all four are best regarded taxonomically as of full specific rank. They have all doubtless evolved from a common ancestor, and form a fairly tight-

knit "species group" in the genus *Oceanodroma*.

On the strength of its long tarsus, Mathews (1934a, 119) proposed placing *melania* in the monotypic genus *Loomelania*, in which he has been followed by Murphy (1936, 744). I cannot see that this is warranted, or accomplishes any nomenclatural improvement, for the short tarsus of *markhami* and the white primary shafts of *matsudairae* make them just as worthy (or unworthy) of generic rank.

Figure 3 also shows by an adequate series of measurements that the two widely separated populations of *tristrami*, one on Laysan Island and the other on the Bonins and southern Izus, are inseparable.

OCEANODROMA LEUCORHOA — Leach's Fork-tailed Storm Petrel

This complex of small, fork-tailed petrels breeds in the northern hemispheres of both the Atlantic and the Pacific. Most authorities agree that the populations of the Atlantic and of the northwest Pacific are inseparable, and recognize the northeastern Pacific population,

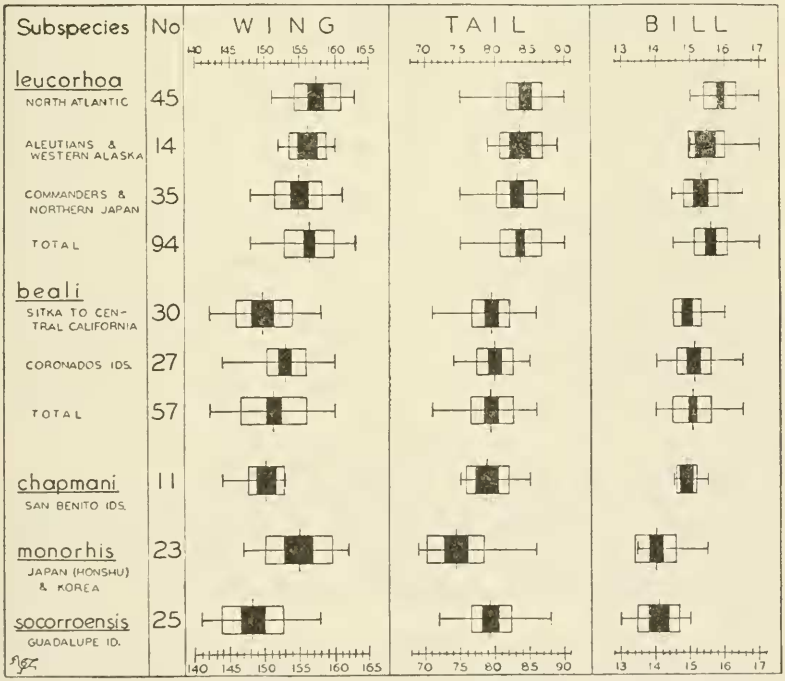

Fig. 4 Diagrammatic representation of measurements of *Oceanodroma leucorhoa* populations from Table 4.

O. l. beali, as smaller, and forming a cline in the variability of the white rump patch as it progresses southward on the west coast of North America, reaching its climax in the black-rumped population of San Benito Island, *O. l. chapmani*. As yet no harmony has been attained in the number of intermediate forms to be recognized in the eastern Pacific.

In the western Pacific, breeding on islands off Honshu, Kyushu, and Korea, is another black-rumped population, *monorhis*, which has been considered specifically distinct, but which is distinguishable from the San Benito population only by slight measurements. No cline either in color or size has yet been demonstrated between *monorhis* and the white-rumped *leucorhoa* population breeding on islands off northern Honshu and Hokkaido, though the latter shows some variability in the amount of white on the rump. In view of the cline between the white- and black-rumped populations in the eastern Pacific, and the fact that the Asiatic black- and white-rumped populations are allopatric, *monorhis* is best regarded as conspecific with *leucorhoa*.

Table 4 and figure 4 show how little difference exists in the measurements of the known populations of *leucorhoa* that have been studied and named. On dimensions alone these are all very weak races. Despite significant differences between the means of some characters, fewer than half of the individuals of many of the recognized subspecies are distinguishable. In the eastern Pacific, however, color can be used with size to advantage. As Loomis (1918) and van Rossem (1942) have pointed out, the white rump patch becomes darker from north to south, and the lead bloom of the upper parts fades to a browner black. The latter character varies with age of the specimen, the lead grays fading to brown in time just as they do in the previous group. This cline runs southward evenly from Sitka, Alaska, to the Farallon Islands off San Francisco, and breaks at Los Coronados Islands, the population of which is intermediate in color between the all-white-rumped birds to the north and the all-black-rumped birds to the south. None of these populations can be differentiated on size alone, and no sharp lines can be drawn between them in color. As none of the intermediate forms in the cline running from southern Alaska to Los Coronados Islands can be recognized, I synonymize both *beldingi* and *willetti* with *beali*.

The Guadalupe Island population, on the other hand, is quite variable in color, but distinctive in its small size. It is intermediate in its rump patch. Only one of the 23 Guadalupe specimens I have

seen is entirely black-rumped, and the amount of white present in the remainder varies from four or five white feathers (as in the type of *socorroensis* which, as van Rossem pointed out (1942) is indeed the Guadalupe bird) to an intermediate condition with half the rump white, about as in the population of the central California coast.

From the material I have examined I believe the *O. leucorhoa* complex should stand as follows:

O. l. leucorhoa: Breeds on islands in the north Atlantic, and in the north Pacific from northern Japan (Hokkaido) through the Kuriles, Commanders, and Aleutians to islands off the west coast of Alaska. It is the largest of all in all measurements, and whitest in the rump patch.

O. l. beali: Breeds from southern Alaska (Sitka region) southward on islands off the west coast of North America to Los Coronados Islands off northern Baja California. Although their means are significantly smaller, on measurements only about half the population is distinguishable from *leucorhoa*. The rump patch varies from almost identical to that of the nominate form in the north, to absence in 50 per cent of Los Coronados population.

O. l. chapmani: Breeds on the San Benito Islands, off central Baja California. Indistinguishable from *beali* in size, but always with a black rump.

O. l. monorhis: Breeds on islands off southern Japan (Honshu and Kyushu) and Korea. Black rumped, and distinguishable from *chapmani* by its shorter bill. Its wing averages longer and its tail shorter than those of both *chapmani* and *socorroensis*.

O. l. socorroensis: Breeds on Guadalupe Island off Baja California. Distinguishable from all other races except *monorhis* by its smaller, slenderer bill. Rump patch variable, almost always with some white, but never as much as in typical *beali*.

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My thanks are also due to Dr. Herbert Friedmann for his courtesy in giving me access to the U.S.N.M. collections, and to Dr. R. C.

Murphy for his generosity not only in making available to me the excellent A.M.N.H. series of his own special group, but also for going over them with me, reading a draft of this paper, and making pertinent suggestions which I have been pleased to follow. Acknowledgements are made particularly to Nagahisa Kuroda, my collaborator in Japan, who measured for me the extensive series of petrels in the Japanese collections, and finally to Dr. J. C. Dickinson, Jr., for his assistance with the statistical methods employed.

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TABLE 1

Geographic variation in *Pterodroma brevipes*

(Measurements in millimeters)

Locality		Laysan, Midway, Lisiansky Ids.	Bonin Ids. & Japan	Fiji & New Hebrides Ids.
No. of specimens		49	28	22
Wing	Range	214–234	213–245	203–226
	Mean with standard error	229.6±.07	227.0±1.2	212.0±1.3
	Standard deviation	5.1	6.1	6.1
Tail	Range	108–123	104–124	91–109
	Mean with standard error	115.53±.49	113.13±.91	98.77±.63
	Standard deviation	3.1	4.8	3.06
Bill	Range	24.0–27.0	23.5–26.5	22.0–28.5
	Mean with standard error	25.5±.13	25.1±.15	24.02±.16
	Standard deviation	0.9	0.8	0.8

TABLE 2

Geographical variation in *Oceanodroma castro*

(Measurements in millimeters)

Locality		Atlantic colonies	Hawaii and Sandwich Ids.	Galapagos Islands	Japan
No. of specimens		50	11	18	28
Wing	Range	143–167	147–159	140–160	140–166
	Mean with standard error	153.46 ± .83	154.8 ± 1.63	153.9 ± 1.05	150.7 ± .92
	Standard deviation	5.9	5.4	4.5	4.9
Tail	Range	66–79	66–78	65–76	60–75
	Mean with standard error	72.46 ± .48	73.18 ± 1.04	72.11 ± .59	71.64 ± .63
	Standard deviation	3.4	3.4	2.5	3.3
Bill	Range	13.6–16.5	13.6–16.0	13.6–16.5	13.1–15.6
	Mean with standard error	14.5 ± .09	14.7 ± .14	14.9 ± .11	14.2 ± .10
	Standard deviation	.64	.47	.47	.52

TABLE 3

Average and inclusive measurements in millimeters of the Black Fork-tailed Petrels

Species	No.	Wing	Tail	Tail Fork	Exposed Culmen	Tarsus
O. markhami	53	173.0 (163–182)	95.0 (86–105)	30.0 (27–35)	18.0 (16–19)	23.8 (22–24.5)
O. melania	34	173.4 (169–179)	84.5 (77–90)	24.9 (17–30)	16.0 (15–17)	31.3 (30–34)
O. matsudairae	127	184.2 (178–194)	103.0 (95–115)	31.9 (26–40)	17.3 (16–19)	26.8 (25–28 5)
O. tristrami	130	181.6 (167–193)	106.7 (98–123)	36.2 (29–45)	17.8 (16–19)	28.0 (27–30.·)
" " Laysan Id.	31	185.1 (167–193)	109.0 (101–123)	37.0 (30–43)	17.7 (16–19)	27.8 (27–29)
" " Bonins, Izus	99	179.7 (171–190)	106.0 (98–116)	36.0 (29–45)	17.8 (16.5–19)	28.0 (27–30.5)

TABLE 4

Geographical variation in *Oceanodroma leucorhoa*

(Measurements in millimeters)

Subspecies		*Oceanodroma leucorhoa leucorhoa*				*Oceanodroma l. beali*			*O. l. chapmani*	*O. l. monorhis*	*O. l. socorroensis*
Locality		North Atlantic	Aleutians and western Alaska	Commanders and northern Japan	Total	Sitka to central California	Coronados Islands	Total	San Benito Islands	Japan and Korea	Guadalupe Island
Number of specimens		45	14	35	94	30	27	57	11	23	25
Wing	Range	151–163	152–160	148–161	148–163	142–158	144–160	142–160	144–153	147–162	141–157
	Mean with standard error	157.4±.48	156.2±.65	155.1±.59	156.3±.36	149.9±.73	153.2±.54	151.34±.64	150.3±.78	154.8±.98	148.8±.88
	Standard deviation	3.2	2.45	3.5	3.45	4.0	2.83	4.82	2.58	4.7	4.4
Tail	Range	75–90	79–89	75–90	75–90	71–86	74–85	71–86	75–85	69–86	72–88
	Mean with standard error	84.4±.38	83.8±.86	83.1±.50	83.8±.31	79.4±.51	79.9±.47	79.5±.42	78.9±.89	74.4±.80	79.4±.66
	Standard deviation	2.58	3.11	2.99	3.01	2.74	2.61	3.18	2.96	4.23	3.10
Bill	Range	15–17	15–17	14.5–16.5	14.5–17	14.5–16	14–16.5	14–16.5	14.5–15.5	13.5–15.5	13–15
	Mean with standard error	15.9±.06	15.4±.15	15.3±.07	15.6±.06	14.9±.07	15.1±.09	15.09±.06	14.9±.09	14.0±.11	14.1±.13
	Standard deviation	.44	.56	.46	.53	.40	.48	.48	.29	.56	.61